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C. L. McAFEE ET AL
COMBINATION RASTER AND CALLIGRAPHIC SCANNING TECHNIQUES FOR
AIRCRAFT DISPLAYS

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Filed Jan. 12, 1967

6 Sheets-Sheet 3

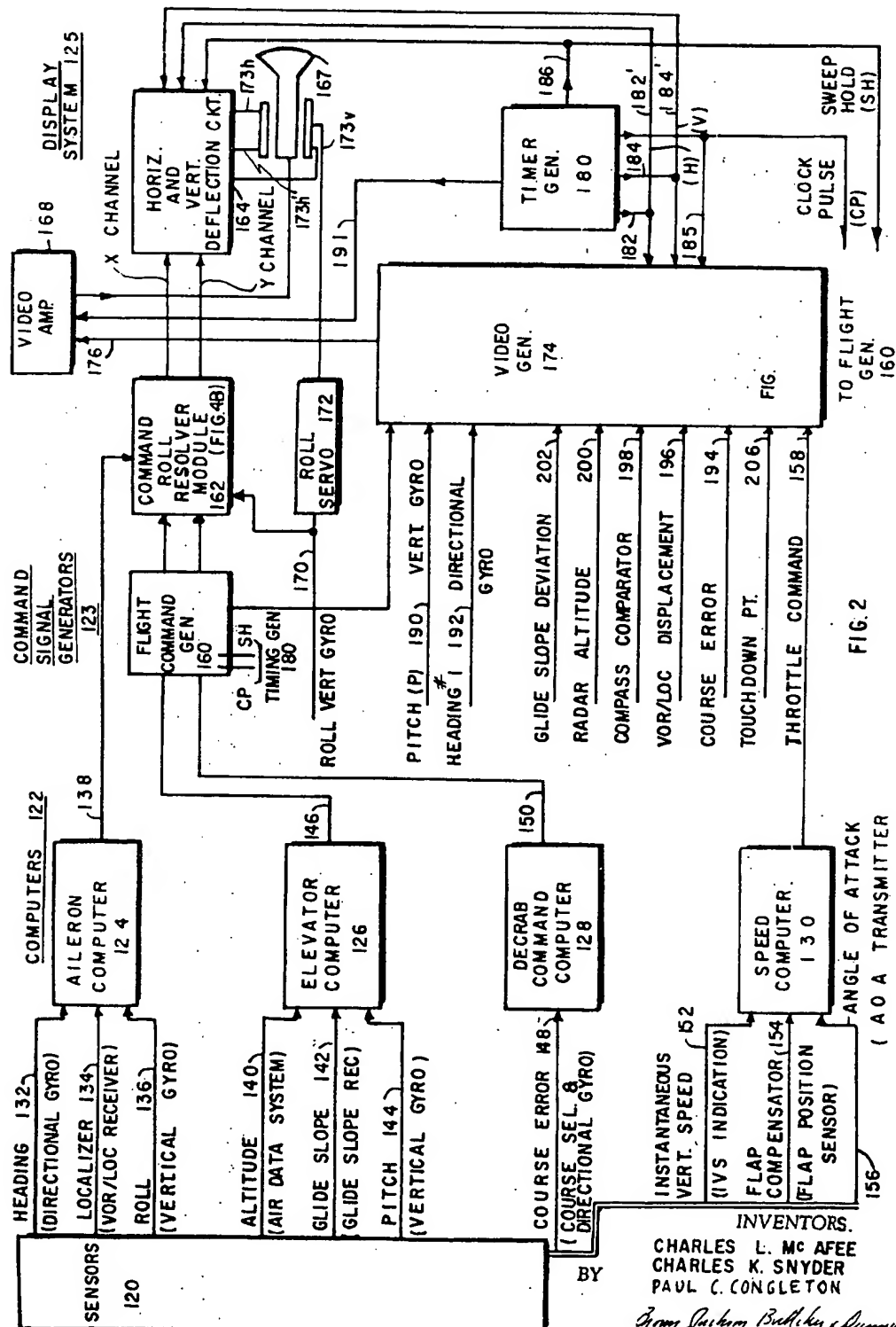


FIG. 2

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[45] Patented May 4, 1971
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[54] DISPLAY SYSTEM FOR USE IN VTOL-TYPE
AIRCRAFT
15 Claims, 6 Drawing Figs.

[52] U.S. Cl..... 340/27,
343/108, 235/150.22, 340/24

[51] Int. Cl..... B64d 45/04

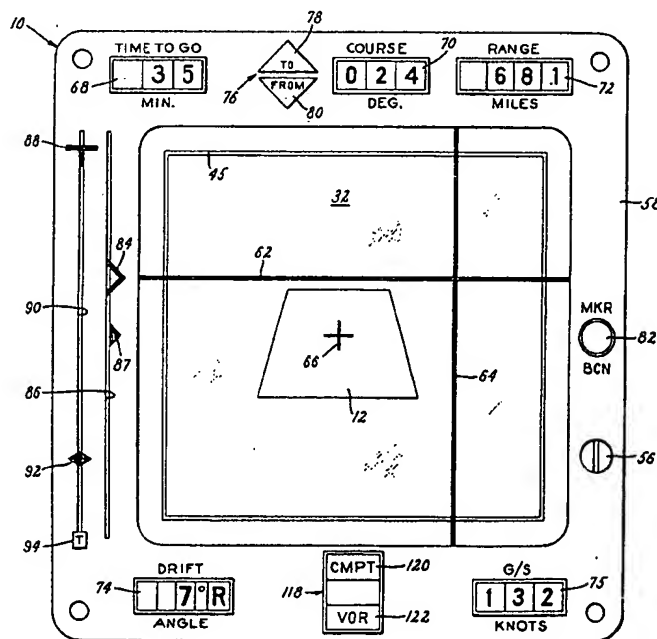
[50] Field of Search..... 340/27
(All); 235/150.23; 235/150.22; 343/108 (SI);
343/108; 356/251, 252; 353/11—14

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ABSTRACT: A system for displaying information relating to the operation of a vehicle, such as an aircraft. An integrated approach/hover indicator provides a pictorial representation of an intended landing site for the aircraft and indicates the position of the aircraft relative to the landing site and relative to a preselected path leading to the landing site. The pictorial representation is displayed in proper perspective such that a pilot viewing the instrument would think he is actually viewing the landing site. In addition, the instrument provides digital readout and other devices which visually display a number of operating values relating to the performance of the aircraft.





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Derman

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(54) **VIRTUAL INSTRUMENT PILOT: AN IMPROVED METHOD AND SYSTEM FOR NAVIGATION AND CONTROL OF FIXED WING AIRCRAFT**

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(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(51) **Int. Cl.⁷** **B64C 13/18; B64C 13/20; G05D 1/00; G05D 3/00; G06F 17/00; G06F 19/00**

(52) **U.S. Cl.** **701/3; 701/11; 701/14; 701/13; 701/33; 701/122; 345/1.3; 345/856; 340/3.5; 340/500; 340/825.72; 340/947; 340/948; 340/979; 340/971; 340/999; 340/975; 340/973; 342/357.08; 342/401; 342/49; 434/29; 434/38; 434/43**

(58) **Field of Search** **701/3, 14, 11, 701/13, 33, 301, 122, 121, 120; 345/1.3, 856; 244/1 R, 158 R; 340/3.5, 500, 825.72, 947, 948, 979, 971, 995, 975, 973; 455/66; 342/357.08, 401, 49; 434/29, 38, 43**

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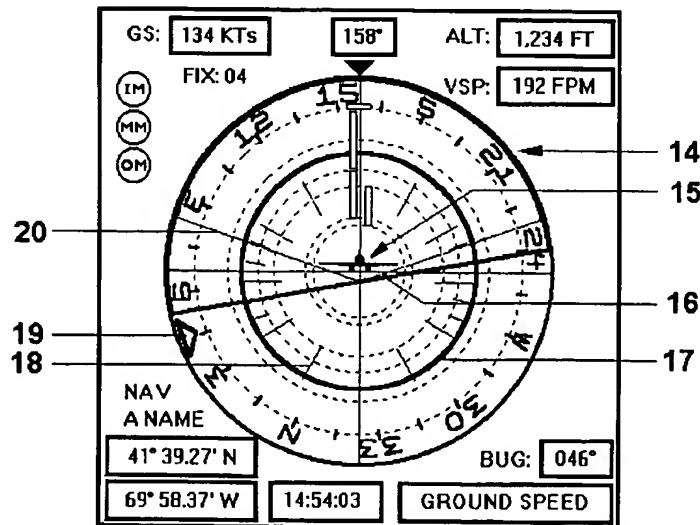
Primary Examiner—William A. Cuchlinski, Jr.

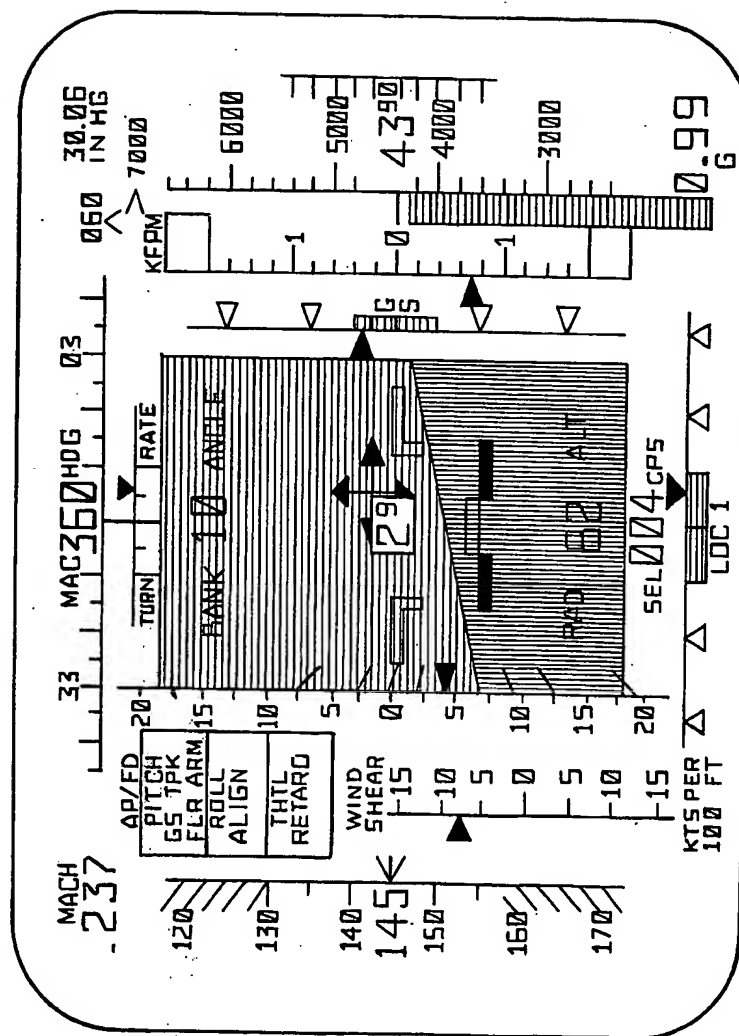
Assistant Examiner—Ronnie Mancho

(57) **ABSTRACT**

A self contained electronic system for manual or automatic control and navigation of fixed winged aircraft using electronic position sensing such as GPS, DGPS, WAAS, and the like, as the primary sensor and making use of known flight characteristics of the aircraft to determine aircraft attitude without any interaction with the aircraft, its controls, or the outside environment and without any moving mechanical devices other than switches, dials and connectors. The automatic and visual interface between the system and the pilot provides for simplified flight controls, and a new solution to the hazard of disorientation, and will reduce the time needed for a pilot to become proficient in VFR and instrument flying. A single instrument replaces many of the conventional instruments used for flight. Navigation data is provided in an easy to understand graphical format. The pilot is told explicitly where to move aircraft controls. The absence of mechanical devices and presence of battery backup make the system extremely reliable and capable of continuing operation of the aircraft independent of the aircraft power or vacuum sources.

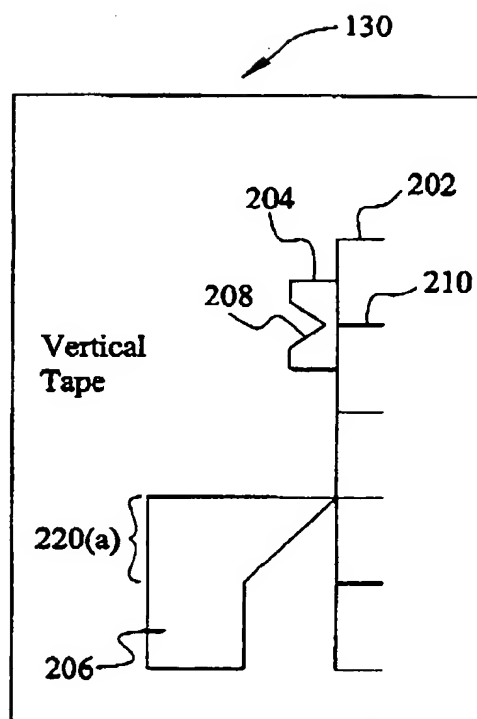
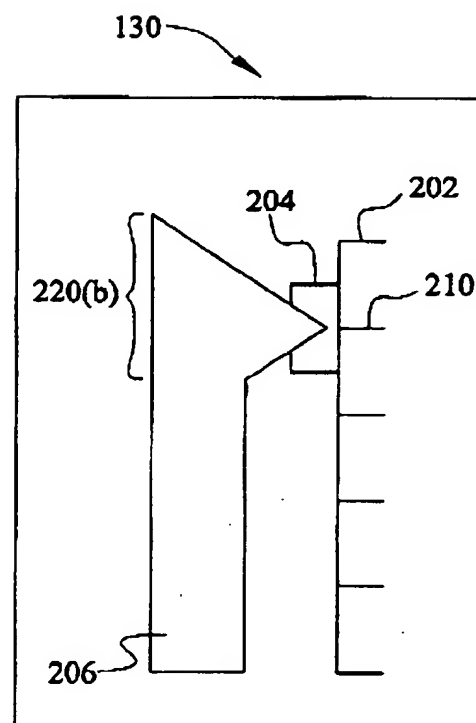
14 Claims, 9 Drawing Sheets





TYPICAL INTEGRATED FLIGHT INSTRUMENT DISPLAY FORMAT

FIG. 2.

*Fig. 2A**Fig. 2B*

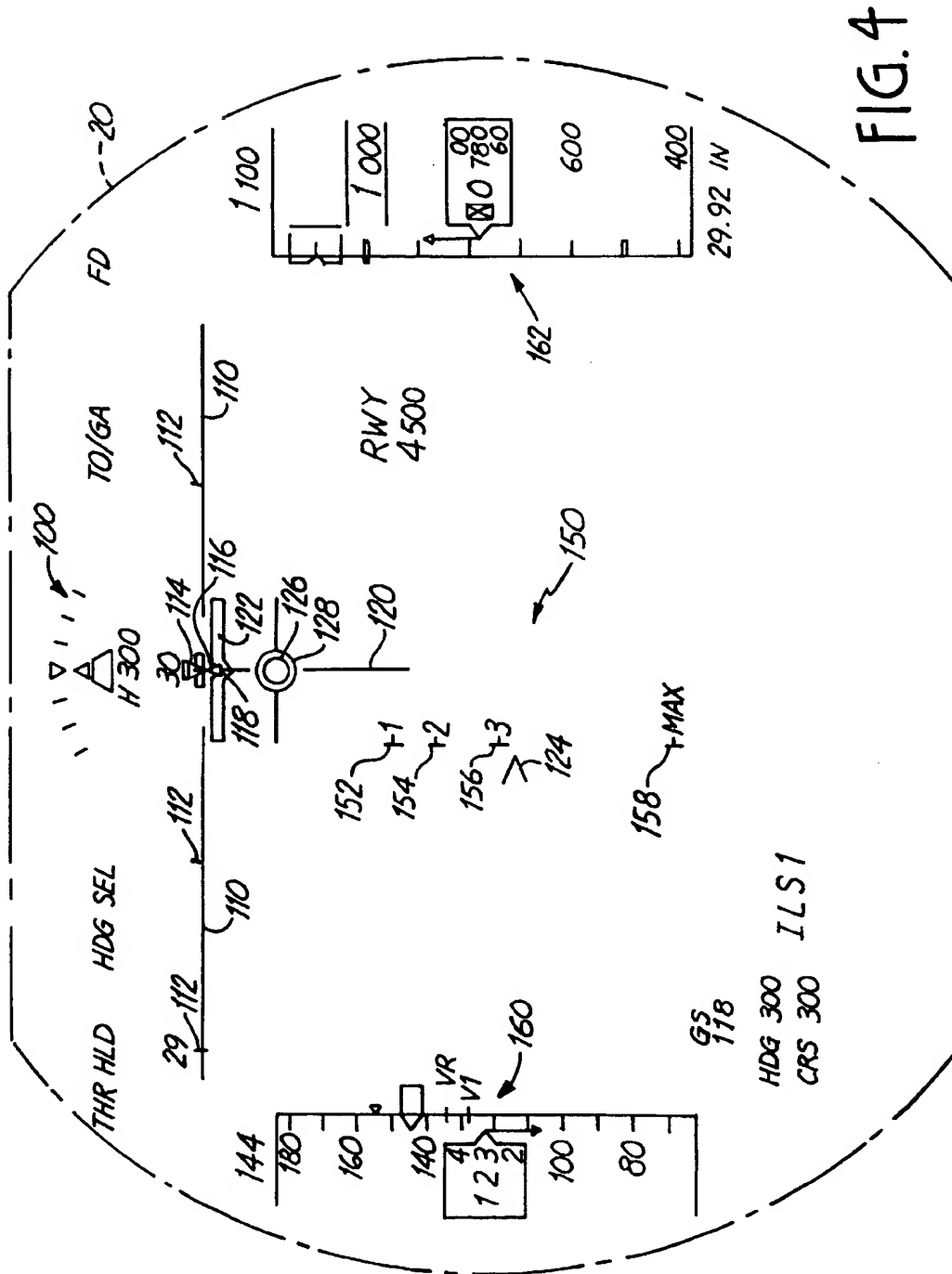


FIG. 4

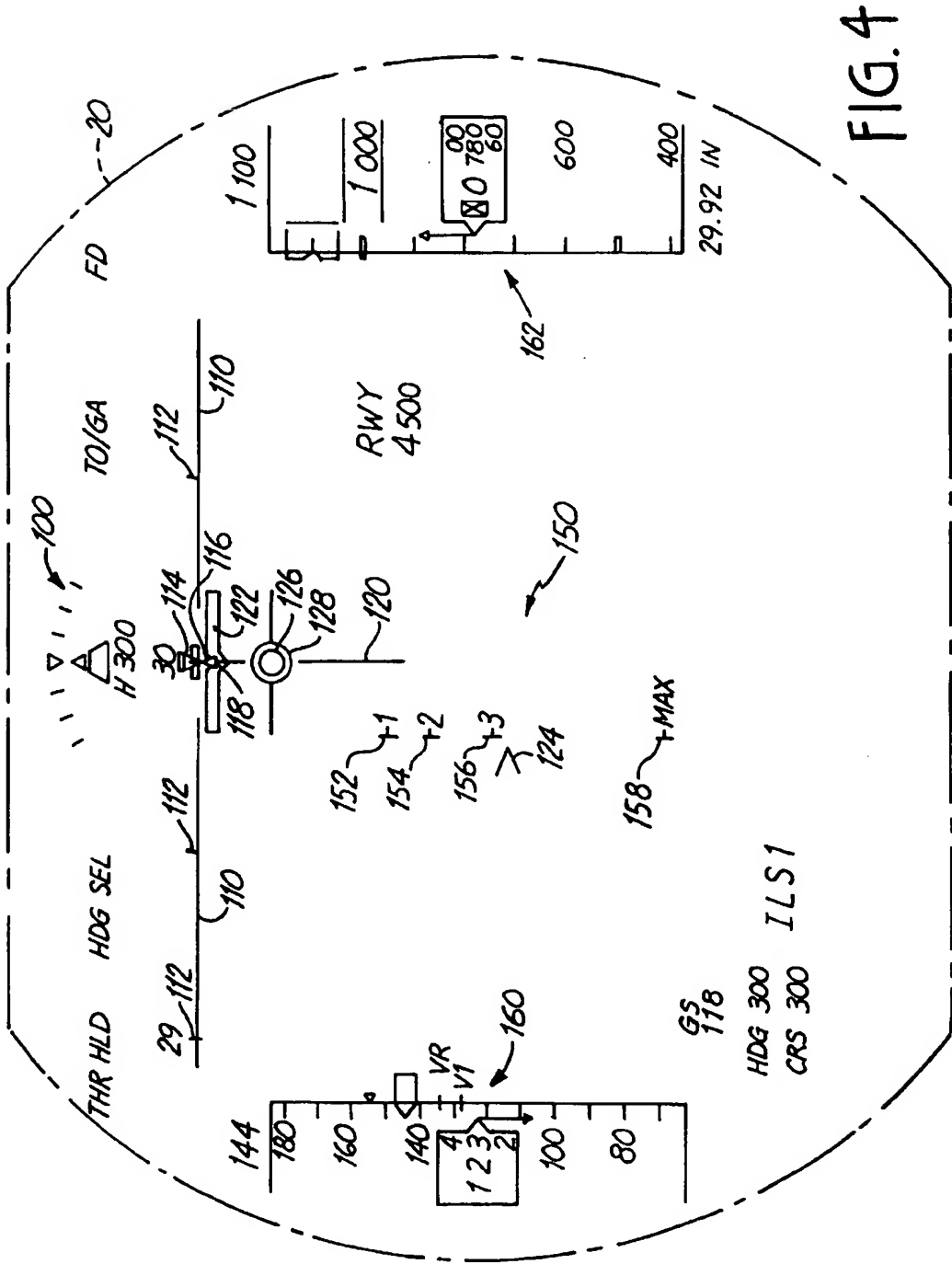


FIG. 4